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EFFECT OF SEED SCARIFICATION ON GERMINATION OF *OROXYLUM INDICUM* (L) VENT. SEEDS, A MEDICINALLY IMPORTANT TREE

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ABSTRACT

Oroxylum indicum (L.) Vent., an endangered medicinal tree found in India and South east Asia, is commonly known as 'Shyonak', Shivnak' or 'Indian trumpet flower' and is a member of family Bignoniaceae. It is a small to medium sized, which is valued for its medicinal properties. This tree is listed as vulnerable and endangered in various parts of India, so mass multiplication of this tree has become necessary for conservation of this species. With the objective to produce good quality nursery stock of this species, the present study was conducted to test the effect of different scarification treatments on germination of Oroxylum indicum seeds. The study revealed that maximum germination per cent was observed in mechanical scarification treatment (73.12 %), which was significantly higher than all the other treatments. The growth parameters such as root & shoot length, collar diameter and weight of the seedlings germinated from mechanically scarified seeds were also better than the seedling from control as well as all the other scarification methods.

KEYWORDS: Scarification, Seed Germination, Oroxylum Indicum, Medicinal Tree & Pre Sowing Seed Treatment

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Original Article

1. INTRODUCTION

Oroxylum indicum (L.) Vent. an endangered medicinal tree, commonly known as 'Shyonak', 'Shivnak' or 'Indian trumpet flower', is a member of family Bignoniaceae and is a widely used species in Ayurveda for the treatment of various ailments. It is a small to medium sized, soft-wooded, deciduous tree which attains a height of upto 12 m. *Oroxylum indicum* (L.) Vent. grows in India, Sri Lanka, South China, Celebs, Philippines and Malaysia. Except in the western drier area, it is distributed throughout India upto an altitude of 1200 m and found mainly in ravine and moist places in the forests (Chauhan, 2006). This tree is valued for its anti-microbial, anti-arthritic, anti-cancerous and anti-hepatatic qualities in its various parts. Extract of the root of this tree have been used for long in ayurvedic preperations like Dashmularisht and Chyawanprash (Yasodha *et al.*, 2004; Chen *et al.*, 2003). A number of secondary metabolites like flavonoids, glycosides, alkaloids, tannins, terpenoids, etc., have been reported from this tree. The phytochemical screening of crude extracts from seeds, stem bark and root of *Oroxylum indicum* showed the presence of bioactive substances that can be used in prevention of major diseases (Samatha *et al* 2012). *Oroxylum indicum* was distributed throughout the great parts of India but now it is listed amongst endangered species in many areas in the country (Najar and Agnihotri 2012). This tree is listed as vulnerable in Karnataka and Andhra Pradesh, and endangered in Maharashtra, Madhya Pradesh and Chhattisgarh (Darshan and Ved, 2003). Destructive and non-sustainable collection methods such as uprooting the whole of the tree along with the roots for medicinal purposes coupled with low regeneration and habitat destruction have posed serious threat to the survival

and availability of this highly useful tree (Yasodha *et al*, 2004). Very little effort has been made to conserve this species, so, its conservation and has become an immediate need of the country. The seed set of this tree is poor and the seed viability is also low (Twari *et al*, 2007). Proper nursery growing techniques are not available for this species and its cultivation is also not being followed at a large scale by farmers as well as by government agencies. So, with the major objective of standardizing the technique of good quality nursery stock of *Oroxylum indicum*, the present study was conducted to test the effect of different types of scarification on germination of seeds of this species.

2. MATERIALS AND METHODS

The research experiments were carried out in the Himalayan Forest Research Institute Nursery, Bir Palasi, Nalagarh, Distt Solan (H.P.), India. The pods of *Oroxylum indicum* were collected before splitting of the pod from Jogindernagar, (H.P.) and Pathankot (Punjab). The seeds were then separated from these pods and different scarification techniques were used to test the best suitable technique for better germination of the seeds of this species. The following scarification treatments were given: -

- T1 - Control
- T2 - Mechanical scarification
- T3 - Sulphuric acid treatment for 1/2 minute
- T4 - Sulphuric acid treatment for 1 minute
- T5 - Acetic acid treatment for 2 minutes
- T6 - Acetic acid treatment for 5 minutes

In mechanical scarification, the papery wings of the seeds were removed using scissors and the seeds were then sown in seed beds. For acid scarification, concentrated sulphuric acid and acetic acid were used. The seeds were dipped in a beaker containing the acid as mentioned in the treatments above and were then removed from the beaker and washed under running water. A control was also maintained, where no scarification was done. The treated seeds were then sown in Completely Randomized Design with four replications having fifty seeds in each replication.

Under the germination study, the number of days taken from sowing to start of emergence in and germination percentage (%) of the seeds was observed. The germination percentage was calculated using the following formula:

$$\textbf{Germination percentage (\%)} = \frac{\textbf{No.of seeds germinated}}{\textbf{No.of seed sown}} \textbf{ x100}$$

In addition to this, observations on other growth parameters such as root length (cm), shoot length (cm), collar diameter (mm), and plant weight (g) were also recorded. These growth performance parameters were studied by taking ten seedlings from each replication of all the treatments after three months of sowing. The data thus obtained were subjected to analysis of variance and the critical difference (CD) was calculated at significance level of P=0.05.The data recorded were analysed using ANOVA.

3. RESULTS

The results revealed that the treatment T2 i.e. mechanical scarification of seeds resulted in highest germination per cent (73.12%) and the days taken to first emergence was also least in T2 (8 days). The data on germination of seeds in each

treatment are presented in table 1. The growth parameters i.e. root length, shoot length, collar diameter and plant weight of the seedlings were also found to be highest in T2 (Table 2).

Table 1: Effect of Scarification on Germination of Oroxylum Indicum Seeds

Treatments	Germination Percentage (%)	Days to First Emergence (No. of days)
T1- Control	32.5	13
T2- Mechanical scarification	73.125	8
T3- Sulphuric acid treatment for ½ minute	22.5	11.5
T4- Sulphuric acid treatment 1 minute	17.5	11.5
T5- Acetic acid for 2 min	31.875	12.75
T6- Acetic acid for 5 min	33.75	13.5
S/NS	S	S
CD (0.05)	10.153	2.519
* S= Significant, NS= Non significant		

Table 2: Effect of Scarification on Growth Performance of Oroxylum Indicum Seedlings

Treatments	Root Length (cm)	Shoot Length (cm)	Collar Diameter (mm)	Plant wt (g)
T1	15.455	13.048	3.43	19.663
T2	21.633	14.55	4.34	23.75
T3	19.9	13.598	3.22	22.45
T4	19.195	12.48	3.223	18.963
T5	16.175	10.665	3.328	19.68
T6	16.943	11.083	3.548	20.605
S/NS	S	NS	NS	NS
CD (0.05)	4.210	-	-	-
* S= Significant, NS= Non significant				

4. DISCUSSIONS

The germination percent in seeds where mechanical scarification was done (73.12%) was significantly higher than the control (32.50%) as well as all the other methods of scarification. It can be inferred from theses results that mechanically removing the papery seed coat of *Oroxylum indicum* seeds breaks the seed dormancy and helps in the better absorption of water, thus leading to higher germination. Similar results, showing increased germination in seeds sown after removal of seed coat by mechanical scarification, were observed in some other species such as *Annona squamosa* (Adeniji *et al*, 2014), *Acacia farnesiana* (Tadros *et al*, 2011), *Pinus gerardiana* (Saeed & Thanos, 2006), etc. The seeds treated with Sulphuric acid for 0.5 minute (T3) well as 1 minute (T4) resulted in lower germination (22.5 % & 17.5 %, respectively), which was found to be significantly lower than the that observed in untreated seeds i.e. control (32.5%). This reduction in germination per cent in acid scarification using sulphuric acid may be due to the detrimental effect of acids on the embryo of the seeds as the seeds coat of these seeds is very thin. Similar corrosive physical action of sulphuric acid on the seeds of *Oroxylum indicum* was also observed by Singh *et al* (2014). The scarification treatment of the seeds of this species with acetic acid (T5 & T6) did not affect germination as no significant difference was observed in the germination percent as well as days to emergence in these treatments as compared to the control. It was observed that the number of days taken by the seeds to start of emergence were minimum in T2 (8 days), thus making it the best suitable treatment for fast and higher germination. Mechanical scarification also resulted in maximum root length, shoot length, collar diameter and plant weight of the seedlings (21.63 cm, 14.55 cm, 4.34 mm and 23.75g, respectively). The better growth performance of the seedlings of treatment T2 may be attributed to the early emergence of seeds.

5. CONCLUSIONS

From the present study, it can be concluded that removing the seed coat of *Oroxylum indicum* (L.) Vent. seed mechanically, using a pair of scissors significantly improves the germination percentage and results in faster germination. The growth characters of the seedling such as root & shoot length, collar diameter and plant weight are also better in mechanically scarified seed. This practice can thus be adopted for getting better germination in this species and to produce quality nursery stock, which thus can ultimately help in conserving this important tree species.

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